

**FIRE SERVICE OPERATIONS INVOLVING
CIVILIAN DECONTAMINATION
AT HAZARDOUS MATERIAL INCIDENTS**

EXECUTIVE ANALYSIS OF FIRE SERVICE
OPERATIONS IN EMERGENCY MANAGEMENT

by

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Abstract

This project researched the Boston Fire Department's procedures regarding civilian decontamination at hazardous materials (haz-mat) incidents.

The purpose of this applied research project was to address the following concerns:

- increasing the level of understanding our chiefs have of civilian decontamination;
- providing a system that puts as much emphasis on civilian decontamination as it does on other aspects of a haz-mat incident;
- providing the training and equipment necessary to enhance our capabilities for providing decontamination to the civilian population.

Evaluative and action research was used to (a) address our weaknesses in the current system regarding civilian decontamination, (b) discover how other large city fire departments have addressed this topic, (c) survey our chief officers and assess their opinions on civilian decontamination and how it relates to our haz-mat program, and (d) produce a training seminar for incident commanders regarding a haz-mat incident and civilian decontamination.

Procedures used were reviewing textbooks, journals, and fire service publications received from the National Fire Academy's Learning Resource Center. The use of personal interviews was employed and a survey was sent to chief officers of the Boston Fire Department and to haz-mat officers of fire departments in other cities.

Survey results indicate that performing civilian decontamination at haz-mat incidents is perceived to be a fire service function. Problems arise when providing for basic human needs such as modesty, shelter, and protection from inclement weather. The legal authority to detain contaminated civilians was also a concern. Current training and information provided to chief officers regarding civilian decontamination was felt by many to be inadequate.

Recommendations were made to include haz-mat and decontamination information in public education programs and to upgrade haz-mat training for chief officers, including demonstrations of decontamination procedures and haz-mat incident command. Allocation of more funds to acquire proper equipment and training dedicated to civilian decontamination was also suggested.

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Introduction

The Boston Fire Department has the authority for all hazardous materials incidents in its jurisdiction. This authority is mandated to all heads of fire departments by Commonwealth of Massachusetts Regulation (CMR) 527 1.03. A crucial part of any hazardous materials incident is decontamination of fire personnel and civilians at the scene of the event. The recent use of weapons of mass destruction in Tokyo, Japan and Oklahoma City, OK poses a potential for needing to provide large scale civilian decontamination with very short notice.

The problem was that no formal plan existed within the Boston Fire Department that addressed the personal needs of the civilian population that had to be decontaminated at a hazardous materials incident. These needs are provisions for modesty, shelter, weather considerations, and information on scene explaining the reasons for this procedure taking place. This was seen as a problem by the author because if civilians were not comfortable with the decontamination process they would be more apt to leave the scene, foregoing the process. This would cause secondary contamination in their homes, in transit, or even in the emergency rooms of hospitals. Some fire chiefs do not feel confident implementing civilian

decontamination without a proper system to address the personal needs of the civilian population. They may feel that in some cases the decontamination process is more harmful than the product of contamination. This has been the case in incidents involving the elderly, the very young, and the injured.

The purpose of this applied research project was to address the following concerns:

- to increase the level of understanding that our chiefs have of civilian decontamination;
- to identify critical components of a system which puts as much emphasis on civilian decontamination as it does on other aspects of a hazardous materials incident;
- to identify the training and equipment deemed necessary to enhance our capabilities for providing decontamination to the civilian population.

This project used evaluative and action research methodology and employed the following procedures. First, a review of our current Standard Operating Procedures for hazardous material incidents. Second, a review of fire service and Federal Emergency Management Agency (FEMA) manuals regarding hazardous material incidents. Third, a review of articles written by professionals in the hazardous materials field, received from the National Fire Academy's Learning

Resource Center. Fourth, a questionnaire was composed and sent to fifty fire chiefs within the Boston Fire Department to determine their understanding of, and to tap their experiences regarding civilian decontamination at a hazardous materials incident (Appendix A). Finally, a questionnaire was sent to twelve major city fire departments to determine if the problem existed elsewhere, and to gain input toward improving our own system (Appendix B).

From this research, results were reported and recommendations were made to improve our training and capabilities for providing a decontamination system for the public that meets their basic human needs, while at the same time meets the needs of the fire service. The Boston Fire Department wants to build a comprehensive system that can be used at small incidents and expanded to address large scale incidents.

Background & Significance

Background

Boston, Massachusetts is a large northeastern city with a nighttime population of 550,000 people which springboards to over 2 million people during the daylight working hours. The city is bordered by the historic Boston harbor on the east,

large railroad yards to the west, a large petroleum facility to the north, and a liquefied natural gas storage facility in our southern sector.

These locations require the Boston Fire Department's hazardous materials companies to remain prepared and vigilant. Boston is also going through one of its largest construction endeavors ever encountered. Because of a federal mandate, Boston is rebuilding its entire sewerage disposal facility. A major thruway is also being relocated underground.

Boston's normal demographics coupled with its ongoing special construction projects have increased calls for confined space rescue, construction collapse, and also hazardous materials. Boston responded to 1136 haz-mat incident in 1996 and 1128 haz-mat incidents in 1997.

The Boston Fire Department (BFD) consists of thirty-three engine companies, twenty-one ladder companies, two heavy rescue companies, a haz-mat unit, a special operations unit, twelve District Chiefs, and two Deputy Chiefs on duty at all times for response to incidents. The department has 1279 members and maintains a force of 280 members per shift. Our haz-mat companies consist of two heavy rescue companies, and two ladder companies trained to the haz-mat technician level. Decontamination (decon) at haz-mat incidents was done by four decon engine companies. The increase in construction related

incidents has required the BFD to remove haz-mat duties from the rescue companies and assign these duties to two ladder companies and two engine companies for a total of four trained haz-mat teams (80 members). These teams provide entry and mitigation capabilities. Decon companies were increased from four trained engine companies to eight trained engine companies (160 members). The BFD has a comprehensive hazardous materials program able to respond to incidents in all sections of the city.

Significance

This applied research project was important to the National Fire Academy's NFA "Executive Analysis of Fire Service Operations in Emergency Management" course because information from this course involved incorporating the fire service with the local disaster planning team. Local governments and agencies must know the capabilities and the needs of the fire service before a disaster strikes and the fire service must interact with these agencies to manage such a disaster. It is important for executive fire officers to understand emergency management concepts and to become involved in local disaster planning. Hazardous materials incidents, in particular, can cause large scale evacuations, activation of shelters, hospital closures, and water

emergencies. Fire service interaction with emergency management agencies is imperative to coordinate these demands.

The fire service in the City of Boston is recognized as the leader in handling all disasters within the city. This is mandated by Commonwealth of Massachusetts Regulation 527.103 (Appendix C) and city ordinance section 1.05(b) of chapter 28(1989)(Appendix D). The Director of Emergency Management is a Deputy Fire Chief and the Deputy Director of Emergency Management is a District Fire Chief.

This project focused on decontamination of civilians at a hazardous materials incident. Most incidents involve small numbers of civilians needing decon. However, an incident occurred in Tokyo, Japan on March 20, 1995 involving an entire subway system used by thousands of civilians everyday. A terrorist group released a nerve agent within the subway during the morning rush hour. At the end of the day there were fifteen stations affected, 3,796 injured, 1,000 hospitalized, and 12 dead. If the fire service is to properly provide a haz-mat response, including decon, at this type of event, it can only be done if there is a plan prepared in advance. Decon procedures must now include provisions for mass decon of civilians, in the event a terrorist attack using a chemical agent were to occur in our city.

The focus of this project was to create a decon program for the BFD that addressed the existing needs of responding to accidents at fixed facilities and transport vehicles; and was capable of expanding to meet the needs of a mass casualty event.

The fire service is relied upon by the medical community to provide proper decon for protection of patients and staff. Prevention of secondary contamination is a life hazard that must receive top priority at a haz-mat incident. FEMA's (Federal Emergency Management Agency) doctrine of preparing for all hazards has compelled the BFD to review its decon capabilities and to take necessary actions to meet the needs of a mass casualty incident.

Literature Review

The Decontamination Process

"Anything or anyone entering the hot zone is considered to be contaminated, and must be decontaminated before leaving the zone. This includes responders, victims, onlookers, and equipment" (FEMA 1992 p.8-4). FEMA continues by adding that decontamination procedures shall be followed when a chemical release has occurred and contamination is suspected, but not apparent.

The International Fire Service Training Association (IFSTA)(1994) defines contamination as the transfer of a hazardous material to persons, equipment, and the environment in unacceptable quantities, within the hot zone. Contamination occurring outside of the hot zone is called secondary contamination, which occurs when no decontamination, or inadequate decontamination is provided.

A secondary contamination situation can range from no consequence to deadly. In one case, a father bringing home clothes contaminated with a pesticide exposed a child to the chemical, resulting in the child's death (Carroll, 1995).

An incident occurring in Castic, CA involved a tanker truck carrying a corrosive product which poured onto the highway and contaminated emergency responders. After experiencing the toxic effects of the product, the responders were transported to a hospital. This incident had no decon process set up for its responders. Secondary contamination was passed on to the ambulance providers, and the emergency room staff at the receiving hospital (Coleman, 1983 p.43).

The Role of the Fire Service

Massachusetts state law and Boston City ordinance, has mandated that the fire department provide leadership at hazardous material incidents (CMR 527 1.03 and Boston City

ordinance sec.1.05(b) chap.28 (1989)). Hazardous material incidents by federal law must use an Incident Command System as stated in the Superfund Amendments and Reauthorization Act of 1996 (FEMA Incident Command System Nov. 1995, 1-7). IFSTA (1994) states that the Incident Commander, according to the Occupational Safety and Health Authority regulation 1910.120 (q)(3), is responsible for the following functions:

- establishing the site safety plan;
- implementing a site security and controlling plan to limit the number of personnel operating in the control [hot, warm, support] zones;
- designating a safety officer;
- identifying the materials, or conditions involved in the incident;
- implementing appropriate emergency operations;
- ensuring that appropriate personal protective equipment is worn;
- establishing a decon plan and operation.

Local, state, and federal regulations agree that command, safety, and scene control are the responsibility of the BFD at all hazardous material incidents. It is also the responsibility of the BFD to prevent secondary contamination from leaving the scene of the incident.

The Decontamination Issue

It is believed that many departments do not take decontamination seriously. Part of the problem is that most decontamination equipment is purchased in toy stores. Using wading pools with animated characters lessens the importance of the decontamination procedure (Callan 1993). Callan also states that: "If we are to be successful at haz-mat incident response, decon needs to be given the same degree of importance as control, and containment, levels of protection and risk assessment" (p.32).

The problem may be a training issue and can be rectified by adhering to OSHA regulation 1910.120(q)(6)(v)(1997) which states that: "incident commanders who will assume control of the incident scene beyond the first responder awareness level, shall receive at least 24 hours of training equal to the first responder operations level."

First responders receiving operational training are required by OSHA 1910.120 to attend an eight hour program. The 24 hour training required for incident commanders is more comprehensive and requires that commanders be able to "...know and understand the importance of decontamination procedures" (OSHA 29 CFR 1910.120 (q)(6)(v)(F)).

Decontamination and the Civilian Population

A "civilian" in the context of this project is defined as a person not employed by a public safety agency. Public safety agencies include fire, police, and EMS departments.

After acquiring the training and equipment needed to provide proper decon to prevent secondary contamination, the question remains: Will the civilian population want to participate in the decon process? The answer is probably no, especially if they are unharmed and feel there is no need for the process. People that have injuries or have loved ones that are injured are going to feel that the process is delaying medical care and possibly causing unnecessary harm. Jakubowski (1993) states,

Although patient care may be delayed slightly, it is simpler-and safer for all involved if the patient is decontaminated at the incident scene. Decontamination should occur prior to contact or transport by EMS personnel. This will minimize the level of risk to EMS personnel who may not be properly protected against the contamination... Contamination may spread via blood pressure cuffs, stretcher pads/straps, immobilization devices or oxygen and suction units. (p.20-21)

Care given to injured patients should consist of a primary assessment while simultaneously performing decon.

Priorities do not change with an injured person; airway, breathing, and circulation concerns must be addressed during the decon process. The sooner the decon process is accomplished the sooner the patient can receive more comprehensive medical treatment (Agency for Toxic Substance and Disease Registry vol. 1 p.36).

It is best to perform all decon operations at the scene, within a decon corridor situated in the warm zone. However, this may not always be the most prudent decision when dealing with civilian personnel. The civilian population contains more variables than the firefighter population and special provisions must be made acknowledging this fact. The decon procedure does not always have to be at the scene of the incident.

Decon procedures can also be done at a distant location such as fire stations, school gyms, and indoor car washes. This would require prior arrangements be made with these facilities. When relocating civilians for decon at a distant location the contaminant should be a material that does not pose a large secondary contamination problem. It is warned that hospitals are not necessarily a suitable choice unless a proper decontamination area is provided before the entrance (Hildebrand, Noll, and Yvorra 1988 p.15). McArdle (1991 p. 82) states that:

Keep in mind that effective personal decon includes affording personnel as much privacy and comfort as possible. A well heated environment on a cold day and comfortable water temperatures will go a long way in making sure that personnel take the time to receive adequate decontamination.

Gaining the confidence of the civilian population regarding decon will be easier if the process is kept as simple as possible. Decon procedures can be devised to have as many as twenty steps to as few as three steps. According to Roy (1991) Scott Gordon, hazardous materials field manager for the Virginia Department of Emergency Services states:

No matter how sophisticated the equipment or the number of steps, organization and planning are the keys to successful decontamination, because they lessen confusion at the scene and ensure that everybody knows exactly what their role is and what they have to do (p.103).

We make decon more complicated than it actually is by not training properly, cutting costs on the decon aspects of a hazardous materials incident, and by trying to save time. Paying attention to the decon portion of a hazardous materials incident avoids the civil and criminal prosecution an Incident Commander may face following that incident. Providing proper

decon procedures is a legal as well as moral requirement (McArdle 1991).

Methods and Equipment

There are four main methods of providing decon: Dilution, Absorption, Chemical Degradation, and Isolation and Disposal (Hildebrand et al 1988). They further describe the procedures with the following definitions.

Dilution uses water to flush the contaminant off of the person, and is the most commonly used method because of the availability of water for the fire service. Absorption is the process of using a chemically inert substance to extrapolate the hazardous material from a contaminated area. This process has limited uses when the incident involves contaminated personnel or civilians because most absorbents work best on flat surfaces. Dilution and absorbents do not change the chemical properties of the hazardous product.

Chemical degradation is the process of changing the chemical properties of the hazardous product by using another product to offset its harmful effect. Chemical degradation should only be done after receiving technical advice from the manufacturer to ensure that a safe reaction will take place. Products such as household bleach, detergents, lime, and

isopropyl alcohol are very effective against certain hazardous materials.

Isolation and disposal is a process of removing contaminated articles and disposing of them in a safe manner (Hildebrand et al 1988).

Standard Operating Procedure (SOP) 53B of the Boston Fire Department is a guide for providing decon at a hazardous materials incident and provides information on the proper solutions to prepare for specific hazardous products. For example, it states that using baking soda and water is proper for acids; a bleach solution is best for Bio-hazards; trisodium phosphate and water for PCB's; and calcium hypochlorite and water for pesticides, ammonia, and cyanides. All of these solutions are available on our hazardous materials vehicle. The BFD has also invested in a TOMES (Toxicology Occupational Medical Environmental Series) software information system that can provide the incident commander with the most up-to-date information for providing proper decon at the scene. The information to provide proper decon is available and well known by our hazardous materials teams. SOP 53B contains the most up to date information available for an incident commander to determine which method to employ, when setting up a decon process.

Decon equipment varies from department to department. Equipment used for decon ranges from simple pools and hoses, to tents, and large vehicles such as tractor trailers. Privacy and warmth must be considered if the decon process is to be effective (McArdle 1991). This implies that fire departments should place a stronger emphasis on purchasing equipment to address the basic human needs of warmth and privacy that will encourage civilians to participate in the decon process.

In a written correspondence with John Eversole, Chief Chicago Fire Department and Chairperson of the International Association of Fire Chief's, Hazardous Materials Committee (December 8, 1997) he states: "The issue [civilian decon] that you are concerned with is one of the most unanswered questions we have today... Fire service budgets do not always allow for extensive equipment needed to do this job [decon] with all the modesty and professionalism you and I would like."

Mass Decon

The terrorist incident that took place on the Tokyo subway on March 20, 1995 opened our eyes to a different type of hazardous materials incident, an incident that would require the possible decon of hundreds of civilian personnel. This case involved the use of a "nerve agent" by a terrorist

group to harm or kill a large civilian target. This event took place in one of the world's largest subway systems, during the morning rush hour. The confusion that followed and the size of the area affected made it impossible to control the flow of victims to provide a system for mass decon. Therefore, many victims left the scene and arrived at hospitals in taxis and other forms of uncontrolled transport (Komiya Kamakura 1995).

Casualties in this terrorist incident remained low, due to the inefficient method of dissemination. Had the vapors been heated and blown through the subway cars, or been more than 50% pure, there may have been more casualties. Also, the fact that the Sarin was in vapor form and not a liquid made decon less of an issue at this incident. Victims off-gassed causing less secondary contamination (Sidell Frederick R., MD. untitled transcript of speech).

The use of the incident command system would be mandatory at these types of incidents. FEMA (1997) states that "incidents managed in a systematic way are the most successful at achieving the intended goals" (p.41). An Incident Commander and a staff coordinating strategic and operational goals provides control needed at the scene to properly allocate resources and to provide for scene safety (FEMA, 1997).

Downey (1996) found the following:

Many problems were encountered while attempting to control the situation. Fortunately, the Tokyo Fire Department had the manpower and equipment to effectively deal with this situation. The major problem at this incident was trying to identify the poison used, which was accomplished through a coordinated effort of the various agencies involved. More than 100 firefighters had been injured rescuing and treating victims.... [Downey asks the following questions] Is the fire service prepared to handle [NBC] (nuclear, biological, and chemical) incidents?

Does the fire service have the necessary equipment? What type of training is required for these incidents?
(p.105).

The Boston Fire Department has in place a comprehensive hazardous materials response system. The Emergency Management concept of employing an all-hazard approach rather than an agent-specific approach was used to prepare our hazardous materials teams for a mass casualty event. The benefits of an all-hazard approach as explained by Kneps (1991) include the following:

There are also practical reasons for a general preparedness approach. It is efficient in time, effort,

money, and other resources. An all-hazards approach helps avoid duplication of effort, gaps in disaster responses, and possible conflicts arising from divergent approaches to planning. It is a politically desirable strategy because it eliminates the need to sell different plans to different constituencies. General preparedness increases the efficiency and effectiveness of disaster response through an integrated community planning effort.(p.40)

Developing a decon system to handle hundreds of people can only be accomplished by having a decon system in place that is understood and practiced through disaster training. However, if decon is not performed at the smaller hazardous materials incidents that fire departments respond to everyday, they will not have the improvisational skills required to handle a mass casualty event.

In light of recent terrorist activities, the Boston Fire Department has included training on terrorist hazardous materials events and mass decon, and has updated its equipment and incident command skills to take into account the possibility of mass casualty hazardous materials incidents. (Boston Fire Commissioner Martin E. Pierce Jr., personal communication, December 2, 1997).

Procedures

The methodology used for this applied research project was an evaluative format to:

- improve our current decon program to better serve the civilian population;
- enhance the knowledge of our chief officers to better recognize incidents that require a need for civilian decon;
- transfer that knowledge into skillfully performing civilian decon;
- develop a decon process that would encourage the civilian population to participate.

Action research was also involved. The BFD implemented a two part training program for Deputy and District Chiefs. Part one involved an informational meeting held in November 1997, where all chiefs received training on Haz-mat Incident Command, familiarization training on all haz-mat detection equipment, and awareness training on domestic terrorism and mass decon procedures. Part two was held in December 1997 and involved a demonstration by our haz-mat and decon companies, where the chiefs could directly interact with these members

and have questions answered in a comfortable setting rather than at an actual haz-mat incident.

Survey

- A six (6) part questionnaire was sent out to fifty Deputy and District Chiefs of the BFD for voluntary participation.
- An eight (8) part questionnaire was sent to fifteen large city fire departments, addressed to that Department's "Haz-Mat Officer".

The six (6) part questionnaire was used to gather information and opinions of our current standards of training for chiefs, as to haz-mat incidents in general, and civilian decon in particular.

The eight (8) part questionnaire was used to gather information to evaluate our duties and procedures against those of other departments that served large civilian populations.

The six (6) part questionnaire was delivered to the Deputy and District Chiefs through the "in-house" mail system. The eight part questionnaire was delivered by the U.S. Postal Service.

Thirty (30) of fifty (50) questionnaires were returned from the Boston Fire Chiefs. The questionnaire(Appendix

A)asked six (6) questions. Three (3) questions dealt directly with civilian decon, two (2) questions dealt with the haz-mat problem regarding incident command, and one (1) question was asked regarding domestic terrorism.

Twelve (12) of the fifteen (15) questionnaires that were sent to other major city fire departments were returned. This questionnaire contained eight (8) questions all dealing with civilian decon (Appendix B). The first seven (7) questions could be answered by selecting yes or no. Question eight (8) asked: What do you feel are the major issues that must be addressed concerning the decontamination of civilians at haz-mat incidents?

Assumptions and Limitations

It was assumed that all chiefs questioned within the BFD had responded to, and had varying degrees of knowledge of haz-mat incidents. The inclusion of haz-mat textbooks in the studying material by Commissioner Pierce has increased the knowledge of haz-mat incident command especially by the more recently promoted chiefs.

Assumptions made about the other major cities being surveyed were that they all had varying degrees of involvement in responding to haz-mat incidents.

The limitations were that, in the BFD only chiefs were surveyed and much valuable material might have been brought to light if we had involved captains or lieutenants. The author's intention was to concentrate on the ideas and opinions of the people who would actually be in command and to improve their knowledge and skills.

The limitations in gathering information from other city departments were that some had very little experience decontaminating more than a few civilians at one time, while others had the experience of decontaminating civilians numbering (20) and (50) and (100+). Thus, without the experience of a large decon incident or without including the "domestic terrorism" problem into the haz-mat scenario, a fire department might think a minimal investment put into civilian decon to be adequate. Also, these questionnaires were sent to the Haz-Mat Officers of these Departments. Whereas the BFD questionnaires were sent to chiefs having no specialized training in haz-mat other than operational training.

Definition of Terms

Civilian decon -	The decontamination of a person not employed by a public safety agency (Fire, Police, EMS).
Mass casualty -	An event causing multiple injuries to a large number of people.
Hot zone -	The area at a haz-mat incident containing the hazard.
Warm zone -	The area at a haz-mat incident adjacent to the hot zone containing the decon area.
Support zone -	The area at a haz-mat incident adjacent to the warm zone containing no contamination, and usually contains the incident commander and personnel the commander deems necessary to mitigate the hazard.
PCB -	Poly Chlorinated Biphenyls

Results

Surveys

The results of the six (6) part questionnaire received from the thirty (30) Boston Fire chiefs are tabulated and presented in Table 1. The results of the eight (8) part questionnaire sent to other city fire departments are presented in Table 2.

TABLE 1

SURVEY TO BOSTON FIRE CHIEFS QUESTIONS 1 - 6	YES	NO	VERY LIKELY	LIKELY	UNLIKELY	NO ANS
1. DO YOU FEEL YOUR DUTIES AND RESPONSIBILITIES FOR CIVILIAN DECON ARE CLEARLY SPELLED OUT IN SOP 53 B ?	5	24				1
2. DO YOU FEEL THAT CURRENT TRAINING AND EQUIPMENT ADDRESSES THE NEEDS OF AN INCIDENT COMMANDER TO ADEQUATELY PERFORM CIVILIAN DECON ?	5	25				
3. DO YOU AGREE WITH THE CONCEPT OF ALLOWING THE IC AT A HAZ-MAT INCIDENT TO REQUEST A DECON CHIEF SOLELY FOR THE DECONTAMINATION OF CIVILIANS, WHEN THE IC FEELS THIS IS NECESSARY ?	26	4				
4. WOULD YOU LIKE MORE TRAINING GEARED TOWARD MANAGING A HAZ-MAT INCIDENT ?	25	5				
5. DO YOU FEEL THAT THE BOSTON FIRE DEPARTMENT SHOULD BE RESPONSIBLE FOR DECONING PEOPLE WITH SERIOUS INJURIES ?	27	3				
6. HOW WOULD YOU DESCRIBE THE POTENTIAL FOR A TERRORIST/HAZ-MAT INCIDENT IN THE CITY OF BOSTON ?			5	18	6	1

COMMENTS RECEIVED: 30

Question 1: Do you feel your duties and responsibilities for
civilian decon are clearly spelled out in SOP 53B?

Eighty (80) percent of the participants replied negatively to this question. Information gathered from this applied research project will be used to address civilian decon and make changes to SOP 53B to better serve the needs of fire personnel.

Question 2: Do you feel that current training and equipment addresses the needs of an incident commander to adequately perform civilian decon?

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Again, eighty-two (82) percent of our participants answered negatively indicating a need to specifically address civilian decon and improve our procedures.

Question 3: Do you agree with the concept of allowing the IC at a haz-mat incident to request a Decon Chief solely for the decontamination of civilians, when the IC feels this is necessary?

Eighty-five (85) percent of the participants agreed with this concept. This can now be included in our planning for haz-mat response. Placing a chief in charge of civilian decon at a large haz-mat incident gives civilian decon a high

priority status, and gives the IC the control needed to perform this process.

Question 4: Would you like more training geared toward managing haz-mat incidents?

Eighty-two (82) percent answered affirmatively to this question. The BFD was able to address this issue by sponsoring a two day seminar for all department chiefs. This seminar (held Nov. & Dec. 1997) included training for incident command, civilian and fire personnel decon, with a full hands-on demonstration. Feedback after this seminar was very positive and increased the confidence level of the participants.

Question 5: Do you feel that the BFD should be responsible for deconing people with serious injuries?

Ninety (90) percent answered in the affirmative. This indicated that they understood the importance of decon, and they understood the concept. The problem was the lack of information they had with which to implement the process.

Question 6: (This question was asked because of its direct relationship to a "mass decon" incident) How would you describe the potential for a terrorist/haz-mat incident in the City of Boston?

Sixty (60) percent answered that Boston was a "likely" target for a terrorist event and seventeen (17) percent answered "very likely". From this information the BFD included terrorist awareness information in the seminar held in November and December 1997. FEMA's self-study course, "*Emergency Response to Terrorism*", was offered to all Department members, and Commissioner Pierce instructed our Training Division to make arrangements with FEMA to include the course, "*Emergency Response to Terrorism: Basic Concepts*" (ERT:BC) for all Department members for 1998.

Table 2

SURVEY TO CITIES OUTSIDE BOSTON - HAZ MAT OFFICERS QUESTIONS 1 - 7	YES	NO	N/A	0-25	26- 50	51- 75	76-100	100+
1. DOES YOUR DEPARTMENT HAVE AUTHORITY FOR HAZ- MAT INCIDENTS IN YOUR CITY?	12	0						
2. DOES YOUR DEPARTMENT PERFORM DECONTAMINATION OF CIVILIANS AS PART OF ITS HAZ-MAT FUNCTIONS?	12	0						
3. WHAT IS THE LARGEST NUMBER OF CIVILIANS YOUR DEPARTMENT HAD TO DECONTAMINATE AT A HAZ- MAT INCIDENT?				8	2	0	1	1
4. WERE YOU ABLE TO ADEQUATELY ADDRESS THE ISSUES OF MODESTY, SHELTER, AND WARMTH FOR THESE INDIVIDUALS?	8	3	1					
5. DO YOU FEEL THAT CURRENT TRAINING AND EQUIPMENT ADDRESSES THE NEEDS FOR AN INCIDENT COMMANDER TO ADEQUATELY PERFORM CIVILIAN DECON?	6	5	1					
6. DOES YOUR DEPARTMENT OFFER ANY OTHER TREATMENT OTHER THAN BASIC AIRWAY, BREATHING, AND CIRCULATION (ABC'S) IN THE WARM ZONE?	7	5						
7. IS YOUR DEPARTMENT AWARE OF A LAW THAT ALLOWS ITS MEMBERS TO DETAIN SOMEONE THAT REFUSES TO BE DECONTAMINATED?	3	9						

Question 1: Does your Department have authority for haz-mat incidents in your city?

One hundred (100) percent of the participants answered affirmatively to this question. This indicates that haz-mat response is indeed a fire service function and that this country looks to the fire service for leadership in this field.

Question 2: Does your Department perform decon of civilians as part of its haz-mat function?

One hundred (100) percent of the participants answered affirmatively. The fire service is in agreement that civilian decon is one part of the whole haz-mat incident, and must be addressed along with the other concerns that develop at these incidents.

Question 3: What is the largest number of civilians your department had to decon at a haz-mat incident?

Refer to Table 2 for results. The answers to this question show the wide range of experience that exists in our fire departments regarding civilian decon. Some departments have

encountered large decon events, while others have not faced this problem.

Question 4: Were you able to adequately address the issues of modesty, shelter, and warmth for these individuals?

Sixty-Six (66) percent answered in the affirmative, while twenty five (25) percent answered in the negative with one participant not answering. It is important to note that this survey was sent to haz-mat officers, meaning officers with specialized training. Although sixty-six (66) percent is a majority, it is not an overwhelming majority.

Question 5: Do you feel that current training and equipment addresses the needs of an Incident Commander to adequately perform civilian decon?

Fifty (50) percent answered affirmatively, forty-two (42) percent answered negatively, with one participant not answering.

Question 6: Does your department offer any other treatment (during civilian decon) other than basic airway, breathing, and circulation (ABCs) in the warm zone?

Fifty-eight (58) percent of the participants answered in the affirmative, while forty-two (42) percent answered in the negative. This may indicate the increase in number of fire departments performing the "advanced life support" functions of their cities, and the increase of fire department EMS duties in general.

Question 7: Is your department aware of an law that allows its members to detain someone that refuses to be decontaminated?

Seventy five (75) percent answered in the negative to this question, indicating a need that must be addressed especially when dealing with a "mass decon" event. An Incident Commander that feels he does not have the authority to detain could allow contaminated persons to leave the incident.

Question 8: What do you feel are the major issues that must be addressed concerning the decon of civilians at haz-mat incidents?

Concerns are listed in Table 2A in descending order, from most often mentioned to least often mentioned.

TABLE 2AQUESTION 8

MODESTY	7
SCENE CONTROL	3
SHELTER	3
WARMTH	3
CONTAMINATION OF POLICE/EMS	2
STORAGE OF PERSONAL BELONGINGS	1
SPEED OF DECON	1
EFFECTIVENESS OF DECON	1
MEDICAL TREATMENT	1
ALLOCATING FUNDS FOR DECON	1
NUCLEAR/BIOLOGICAL WEAPONS - TERRORISM	1
CONCERNS OF HOSPITALS	1

Discussion

Preventing secondary contamination is a major responsibility for fire commanders at a haz-mat incident. This is similar to a fire chief's duty at a fire incident where a major responsibility is preventing fire from reaching exposures.

The literature review and the surveys conducted for this research project agree that this is a fire service function, but also a function that needs more resources and training to accomplish. The survey sent to the fire departments across the country may seem less negative than the survey done within the BFD. However, one must keep in mind that those surveys were sent to the haz-mat officer of that department. Had the survey been sent to chiefs without that specialized training, the results may have been more aligned with the Boston chiefs.

The BFD has already benefited from this project. The chiefs have attended a two day seminar dedicated to haz-mat incident command, terrorism awareness, and civilian decon. Another benefit has been the decision to purchase a vehicle to be used for decon at haz-mat incidents.

The most important benefit has been the amount of information received by the BFD from its own chiefs that voluntarily participated in the survey and also from the fire departments across the country, whose knowledge and

information will be used to enhance our haz-mat program, and in particular our civilian decon duties.

The BFD's SOP on decontamination procedures will be updated taking into consideration the needs of the civilian population which will hopefully make this difficult process as comfortable as possible.

Implications

The implications of this project for the BFD is an enhancement of its haz-mat program that will make the City of Boston better prepared for a haz-mat response. Creating a system that takes into consideration the needs of the civilian population will encourage civilian participation rather than rejection. Further research should be conducted as to handling a mass decon incident. Methods devised by the military may be the only procedures that would work in such an event. Fire commanders will have much difficulty controlling this type of an event. Being able to control the smaller and moderate decon incidents must be properly addressed before developing a plan for mass decon.

Recommendations

Based upon the results of this applied research project the following recommendations were made to the Boston Fire Department:

1. Include haz-mat information in the BFD's public education program (Appendix E). It is possible that a citizen will someday be involved in a haz-mat incident. Information on haz-mat and civilian decon could easily be touched on by our own instructors when visiting the city's schools, etc..
2. Discuss the legal implications of civilian decon with legal counsel. Let the field commanders know the opinion of the department lawyer as to detaining civilians that need decon.
3. When funding the haz-mat program, make sure decon training and equipment are properly funded. Purchasing a few plastic children's pools and garden hoses is not the answer, especially in northern climates.
4. Keep chiefs informed of all new haz-mat training and equipment. Chiefs need to know the capabilities of their forces. New detection equipment must be made known to the chiefs as many new advances can be expected to address the chemical and biological agents that may be involved in a terrorist event.
5. Haz-mat incident command training should be increased to address the unique problems that a haz-mat incident commander may encounter.
6. To keep our first responders cognizant of the possibility of terrorism, FEMA's Domestic Terrorism Awareness Training should be offered to all fire department members.

7. The purchase of a vehicle, trailer, or portable shelter for the purpose of civilian decon is probably the only way to address the issues of modesty, shelter, and weather protection. Many fire departments are personally designing such vehicles to mitigate the problems of civilian decon.
8. Emergency managers should start to develop plans for mass decon just as plans for mass evacuations are developed near nuclear plants. Mass decon plans must be considered as long as the threat of "domestic terrorism" exists.
9. Develop a relationship with the area hospitals. Often times contaminated patients arrive in their emergency rooms. The fire service could be called to provide decon; providing protection for hospital personnel and equipment from secondary contamination thus keeping the hospital functional for the community.

Distribute ATSDR Vol. III Managing Haz Mat Incidents: Medical Management Guidelines for Acute Chemical Exposures to all BFD chiefs in the field. This book provides quick information that can be related to civilian personnel at a haz-mat incident. It provides medical and decon information on over 150 hazardous materials that can be used at the incident to gain the public's confidence and to convince them that decon is necessary.

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APPENDIX A

TO: All Deputy Fire Chiefs and District Fire Chiefs

FROM: DFC Gerard Fontana - Emergency Management Division

Your input and ideas are needed to help us revise our decontamination procedures in regards to decontaminating civilians at a haz-mat incident. Please take a few minutes to help us in this endeavor. Please return in the enclosed envelope by November 15, 1997.

1. Do you feel your duties and responsibilities for civilian decon are clearly spelled out in SOP 53B? YES_____ NO_____
2. Do you feel that current training and equipment addresses the needs of an incident commander to adequately perform civilian decon? YES_____ NO_____
3. Do you agree with the concept of allowing the IC at a haz-mat incident to request a Decon Chief solely for the decontamination of civilians, when the IC feels this is necessary? YES_____ NO_____ (*This concept is similar to the EVAC Chief at a high rise incident, and would still have the Safety Chief responsible for decon operations for our members.*)
4. Would you like more training geared toward managing a haz-mat incident? YES_____ NO_____
5. Do you feel that the BFD should be responsible for deconing people with serious injuries? YES_____ NO_____
6. How would you describe the potential for a terrorist/haz-mat incident in the City of Boston?
 VERY LIKELY_____ LIKELY_____ UNLIKELY_____

APPENDIX B

To: Haz Mat Officer

11/14/97

Dear sir;

We at the Boston Fire Department are currently reviewing our procedures for the decontamination of civilians at Hazardous Materials incidents. I also hope to include this information in a research project for the National Fire Academy's Executive Fire Officer's Program.

The following page is a questionnaire that I hope you can answer and return to my office. In this questionnaire the term "civilian" refers to non-public safety personnel. A blank sheet of paper is included for any comments you may wish to offer.

Your cooperation is greatly appreciated.

Sincerely.

Gerard T. Fontana
District Chief Planning & Logistics
Boston Fire Department

1. Does your Department have authority for Haz Mat incidents in your city?
Yes___ No_____
2. Does your Department perform decontamination of civilians as part of its Haz Mat functions?
Yes___ No___
3. Approximately, what was the largest number of civilians your Department had to decontaminate at a Haz Mat incident? _____
4. Were you able to adequately address the issues of modesty, shelter, and warmth for these individuals? Yes___ No_____
5. Do you feel that current training and equipment addresses the needs of an Incident Commander to adequately perform civilian Decon? Yes___ No___
6. Does your Department offer any other treatment other than basic airway, breathing, and circulation (ABCs) in the warm zone? Yes___ No___
7. Is your Department aware of a law or ordinance that allows it's members to detain someone that refuses to be decontaminated? Yes_____ No_____
- (If yes please advise on reverse side)
8. What do you feel are the major issues that must be addressed concerning the decontamination of civilians at Haz Mat incident?

APPENDIX C

Be it ordained by the City Council of Boston, as follows:

1. SECTION **ONE**. The first sentence of section 1.05(b) of chapter
2. 28 of the Ordinances of 1979 is hereby amended by inserting
3. after the words. "public safety" the words: including, but not
4. limited to, fires, explosions, hazardous material incidents,
5. motor vehicle accidents, structural collapses, mass casualty
6. incidents and emergency extrication incidents,.
7. SECTION TWO. The first sentence of section 1.05(b) of Chapter
8. 28 of the Ordinances of 1979 is hereby further amended by
9. inserting after the words "necessary to eliminate such
10. dangerous condition or conditions' the words: directing
11. employees of other City of Boston departments and agencies and.
12. SECTION THREE. This ordinance shall take effect upon its
13. passage.

APPENDIX D

527 CMR BOARD OF FIRE PREVENTION REGULATIONS

-continued

(8) Duties of the Head of the Fire Department: Whenever the maintenance, operation, or use of any land, building, structure, material or other object or any part thereof, including vehicles used in the transport of hazardous materials constitutes a fire or explosion hazard which is dangerous or unsafe, or a menace to the public safety (including, but not limited to, fires, explosions, hazardous materials incidents, motor vehicle accidents, structural collapse, mass casualty incidents and emergency extrication incidents) and the action to be taken to eliminate such dangerous or unsafe condition or conditions which create, or tend to create, the same is not specifically provided for in 527 CMR and unless otherwise prohibited by ordinance, by-law, regulation, the head of the fire department is hereby authorized and empowered to take such action as may be necessary to abate such dangerous or unsafe condition or conditions (directing employees of other city or town departments and agencies) and including the evacuation of buildings and/or the transport of hazardous materials, the speed, routes, amounts, and hours of transport through the city, town or district shall be also regulated.

APPENDIX E

January 6, 1997

Ms. Elaine Mesiti
Boston Fire Department
Public Education Office
115 Southamptton St.
Boston, MA 02118

Dear Elaine;

As Planning & Logistics Chief of the Boston Fire Department It is my opinion that some hazardous materials information should be included in the public education program. This would include information ranging from common hazardous household products to large scale incidents that occur at industrial sites and transportation accidents. The public perception of the Boston Fire Department's role at these incidents must be clarified so that we gain the confidence of the public to properly control these incidents. Our specific goal is to create awareness of the possibility of one day being involved in such an incident, and what the fire department may expect of them in order to prevent secondary contamination from affecting their families and other members of the community. Decontamination procedures should be reviewed as these procedures require relinquishing personal items and also poses privacy issues that are uncomfortable. Addressing these issues beforehand will increase their confidence and understanding.

Please contact me for any further clarification and assistance.

Gerard T. Fontana

District Fire Chief
Planning &

Logistics